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1
VOL. XV

2
OCTOBER, 1908

15951
No. 1

33863
The Agricultural Student

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MAN IN AGRICULTURE



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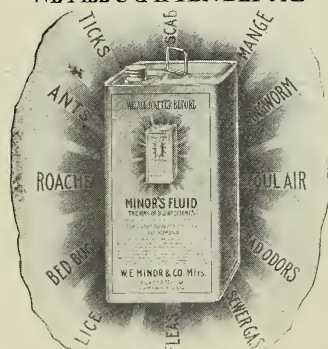
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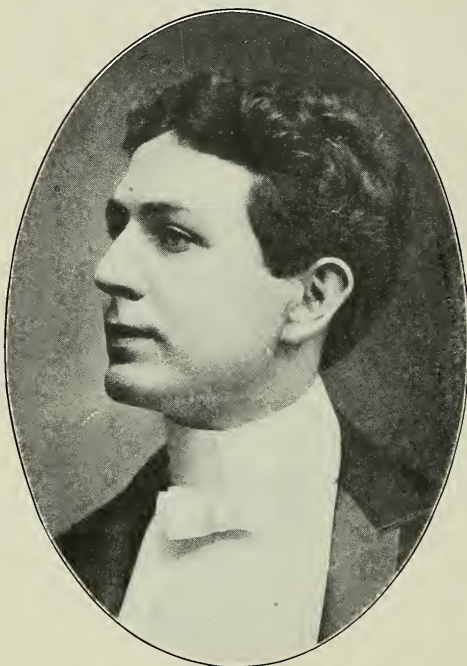
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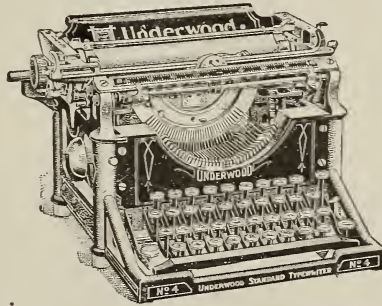
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Published Monthly by
THE AGRICULTURAL SOCIETY
of Ohio State University

Advertising Rates on Application. Address all Correspondence to the Business Manager.

Terms of Subscription:

One Year.....	\$0 50
One-half Year.....	30
Single Copies.....	10

Entered at the Post-Office, Columbus, Ohio, as second-class matter



“**T**he well-being of a people is like a tree: agriculture is its root, manufacture and commerce are its branches and its leaves; if the root is injured, the leaves fall, the branches break away, and the tree dies.”



THE AGRICULTURAL STUDENT.

VOL. XV

OHIO STATE UNIVERSITY, COLUMBUS, OCTOBER, 1908

No. 1

AGRICULTURAL CHILE

Prof. J. C. Hamilton

The agricultural portion of this most interesting little republic may be divided into three natural regions. These divisions are due to climate. The extreme north is desert, and hence does not enter into this account. The central portion of the country is sub-tropical and depends upon irrigation.

This system has been in operation for many years and there has been developed a system of agriculture which in many respects is primitive, yet in others is highly developed. The soil is sandy and with the silt brought down from the mountains and deposited by the irrigation waters, it remains extremely fertile without need of artificial fertilizers.

Undoubtedly the most productive crop is the vine, a great deal of excellent wine being produced. The vineyards are cultivated according to modern methods, but right alongside of a well-kept vineyard one may see a field being plowed for wheat in the most primitive manner possible. They simply scratch up the surface a little with a wooden plow, scatter the seed broadcast and harrow it in with a brush harrow. Their method of harvesting is just as simple. It is cut with the sickle, and tramped out with horses and separated by throwing it up in the air on windy days, these operations all taking place in the open air at the farm-

er's leisure, since there is no danger of rain during the summer season.

What corn is produced is sown in the same primitive fashion, and receives no more cultivation than the wheat. It is not even planted in rows, yet with the great fertility of the soil and abundance of water surprisingly large crops may be produced.

This whole central region is admirably adapted to the cultivation of fruits and vegetables, but as there is no good market except at home this feature has been but little developed. However, for home consumption fruit of all sorts is abundant and cheap.

This region extends for several hundred miles south of the capital until a region is reached where there is a sufficient rainfall to make irrigation unnecessary. This is known as the frontier region because it has only in recent years been opened to settlement by the white race. The Araucanian Indians have heretofore held sway, not undisputed, but nevertheless absolute. However, within the last twenty-five years it has been settled by English and German colonists who have been very successful in wheat culture. They have, of course, employed modern methods, and the song of the reaper and the threshing machine may be heard on all sides during the harvest season. This is undoubtedly destined

to be the wealthiest and most important portion of the republic.

In sharp contrast to the prosperity of the two above-mentioned regions is that of the extreme south where the excessive rain and little sunshine make agricultural operations very difficult and limited. During the winter months the rainfall is practically constant and the hours of sunshine are numbered. During the summer it rains or is cloudy at least half the time. While in winter the temperature never falls below 32° F., in summer it never goes above 75° F.

The large island of Chiloé and an archipelago of small islands between it and the mainland comprise this region. It supports a population of about sixty thousand people who gain their living principally by fishing and growing potatoes.

Their methods of fishing and farming have perhaps not changed materially in the last two hundred years or more, and both are admirably adapted to the circumstances. Farm work here is all done by hand. What few horses there are on the island are used only for riding and oxen for drawing loads. Good roads are unknown on the island, and the principal means of communication between one part of the island and another is by boat.

Their method of potato culture is worthy of note because of the excellent results obtained. They usually select a piece of sod and plant whole, large potatoes in rows of holes dug a few inches deep and cover them lightly. The soil of these old fields is not fertile. It is too much washed by the rains and hence needs fertilizer. This

they obtain by gathering the kelp that is thrown up by the sea during the winter storms and allowing it to partially decay in piles, and when the potatoes are about ready to come up this kelp is spread along the row in rather generous quantities and then the sod is turned from between the rows upon the kelp and then with a sort of light mattock they dig up the soil and make high ridges where the rows are. After this, little, if any, cultivation is necessary. The soil is loose and the constant rains prevent its drying, and the ridge culture prevents the water from injuring them. Experiments made with flat culture, and using sections of potatoes containing two eyes, resulted in a total failure, where carried on side by side with the native method. The cut potatoes nearly all rotted in the cold, wet ground before sprouting, and those that did get above the ground were drowned out long before they reached maturity.

Corn in this climate will not mature. Experiments made with the earliest varieties of sweet corn showed that even they would not develop sufficiently for table use. Wheat and oats thrive and produce good returns, but harvesting in the rain is such a discouraging operation that only small quantities of these cereals are produced, enough only for home consumption.

The farmers here are fortunately disciples of the simple life, and have few wants. Abundance of potatoes, seafood, with homemade unleavened bread, butter, milk and eggs, with now and then a lamb or fowl supply all their wants.

CORN SMUT—USTILAGO ZEAE*H. R. Watts, '10*

Probably no plant diseases are more familiar to the farmer than the rusts and smuts of the grains. Ears of corn, wheat, oats and the other grains are frequently seen presenting a blackened, shrivelled appearance, in sharp contrast to the golden grain around them. These specimens are found to consist of myriads of minute, dark, spherical spores of the fungus. This particular species is not only common in our corn-fields, but is widely distributed in Europe and other countries, and is also found on a large number of grasses, both wild and cultivated. The smuts were known to the early Greeks and Romans, and has been the subject of much discussion in early times.

These tiny, black spores will begin to germinate in less than twelve hours if placed in water. As germination advances, buds, or conidia are formed and the cells of the conidia fuse. The long germ-tubes commonly fuse with other germ-tubes and thus give rise to a third which also bears conidia. This tube is often very long and bears joints, usually three, throughout its length. The buds, or conidia, produced by germ-tubes are capable of producing other conidia until large colonies of conidia are produced in yeast-like condition, free from the spore and its germ-tube. Germination may take place at one or both ends, or one or both sides, and the germ-tube may fuse with each other at any point of contact.

It has long been known that the spores will germinate in water, and if kept dry will retain their power of germination for many years. Fresh spores placed in water of the proper temperature will germinate in 12-48 hours. These spores are spherical cells,

olive-green in color and bear very minute projections on the surface. It would take 105-200 spores placed side by side to measure a distance of one millimeter, or about 50,000 per inch. It has also been calculated that about 8,000,000 can be contained in one square inch. Their lightness enables them to be easily carried by the wind, and in addition to the large number enables the disease to spread rapidly.

It was not until 1866 that proof of infection by conidia was obtained, and the details were not learned until later. When the sporidium comes in direct contact with a very young germinating seedling as the root emerges from the seed and the blade is still below the surface of the ground, it sends out an extremely delicate germ-tube, the end of which bores into the tender cells. The germ-tube once within the young seedling bores its way from cell to cell until it reaches the growing apex in the bud of the shoot. Here it grows, sending out branches into each young side branch as it forms, and in this way infecting the entire plant, but not in any way becoming visible until late in the summer. It may be that none of the mycelium can be found further back in the older and lower parts of the plant, since the hyphae die off behind and leave no traces. The flower-buds will, however, contain an abundance of mycelium.

When the corn-plant is engaged in storing food in the grains, chiefly in the form of starch, the parasite, growing at the expense of the host-plant, forms a dense meshwork of hyphae within the grain. It even causes plant food to move to the diseased grains rather than to the healthy ones, because it is using more food and grow-

ing twice as fast. The spores ripen with the grain and are scattered as the grain is harvested. Many adhere to the grain and are thus sown with the seed in the spring to infect the plants, in the manner described above, as soon as germination begins.

From these facts it was thought that a possible means might be provided whereby the spores could be removed from the seed before planting, and hence many modes of dressing have been employed.

The first was to coat the seed with some poisonous compound which would kill the hyphae before they entered the tissues of the newly-germinating plant. At first the experimenters hoped to kill the spores before they germinated, but this was soon found to be impossible since the coat is too thick and protects the spore too well. As early as 1820 it was believed that grain which had been washed with a solution of copper sulphate before planting gave fewer diseased ears. The grain was usually soaked in a weak solution, then quickly dried and sowed. Common salt, sodium sulphate and potassium permanganate have also been used as dressings.

The second method tried was to wash off the spores by clear water,—it being thought that the spores would float because they were so light. This method, although possible, is not practical.

The third method was to subject the grain to violent blasts of air and thus forcibly blow the spores from the seed, but this method was found to injure many of the grains. Singing the grain was also tried but found ineffective, as the dry spores will resist a very high temperature. On the other hand, freezing under the ordinary conditions has

been found to have no effect upon them.

After many experiments it was found that the methods of dressing were not of great value, since fields planted with the best dressed seed were far from being free from the disease.

Fresh manure was also found to be a source of danger, and in many cases smutted ears occurred on plots fertilized with manure and straw. Experiments also showed that spores not only possessed their power of germination after passing through the intestines of animals, but that they germinated much more readily.

In 1883, Brefeld, who has done a great deal towards solving these problems, published his views on the subject. He showed that if the spores are sown in solutions of extracts of manure—as they are likely to be in the cornfield—the mode of germination differs from those in other conditions. Spores germinating in water send out germ-tubes from which conidia grow; but those germinating in the extracts of manure do not stop here. Each conidium soon produces many others, each sending out a bulge from its surface. This bulge grows to be as large as the conidium, then falls off and repeats the process of growth.

If a conidium is placed in liquid manure it soon produces a new conidium which gives rise to two more, and each of these multiply in the same manner until within a short time millions are produced, each of which is capable of affecting a plant if it comes in contact with the tender parts. Now when we think of this process going on in a manure pile we wonder how any field of corn can escape the smut, even though millions of spores are probably lost where only one performs the function

of infecting a new plant and thus propagating the disease.

The disease is spread by spores blown over the field by the wind and by the spores getting on the ears during the harvesting of the crop and being sown with the seed in the spring. Many smut nodules are broken off and fall to the ground in the process of cutting and these are broken up and scattered by the harrow and other implements used in preparing the ground for wheat.

In some fields in this State about $4\frac{1}{2}$ per cent. of the stalks were smutted, and $\frac{1}{2}$ of 1 per cent. was a total loss in 1895. The loss of grain on this

basis for the year in the entire State was \$125,000. It has also been estimated that the annual loss in the United States due to smut is \$2,000,000.

While many methods have been tried to check the disease and thus prevent the annual loss of so much grain, none have been found which will entirely rid the crop from the disease. The most effective of the above-named remedies is the dressing of copper sulphate made by dissolving one pound of the crystals to one gallon of water. The most effective remedy, although in many cases it may seem impractical, is to collect and burn these nodules before they reach maturity.

CORN IMPROVEMENT

W. L. Elser, '09

Corn is perhaps the most important cereal grown in the United States. The average yield of the whole country is something like twenty-seven bushels per acre. The seven corn states—Ohio, Indiana, Illinois, Iowa, Missouri, Kansas and Nebraska—produce about two-thirds of the entire crop of the country, and the average yield per acre of these seven states is about thirty-eight bushels.

It is possible within a few years to double the average production of corn per acre in the United States and to accomplish it without any increase in work or expense. It should not be understood that the present corn crop will be doubled, but that the same yield will be produced on a smaller number of acres. If fifty-five or sixty bushels are raised on one acre instead of two,

the labor of plowing, harrowing, planting, cultivating and harvesting will be greatly reduced, and consequently the cost of production will be reduced.

Poor corn crops are usually attributed to unfavorable weather conditions, and quite often this is the true cause, as there are few summers during which the crop does not suffer more or less from unfavorable weather conditions at some stage of its growth. However, there are other conditions which are responsible for the low production. These conditions are under the direct control of the farmer, and it is up to him as to whether he will increase and in many cases double his present yield.

It is gratifying to note that on every hand the farmers are taking a greater interest in the improvement of their

corn. They are constantly asking questions as to methods of improvement and where good seed of improved varieties may be obtained. Nearly all the states which produce corn in any quantity at all now have some kind of an association to improve the corn crop. While Ohio is one of the corn producing states, it is interested in corn as never before; yet, as in everything else, this state has been conservative in this matter, and was one of the last to organize such an association. However, by being conservative and profiting by the mistakes of other organizations, Ohio was able to perfect a stronger organization and one which is doing as great a work as that in any other state.

The Ohio Corn Improvement Association is an organization of farmers to improve Ohio's corn crops. It was organized at Townshend Hall January 15, 1908, when 161 delegates met there, representing fifty-four counties, and adopted a state constitution and by-laws, forty of which counties have since effected forty-three permanent organizations, with a total of about 1500 members. This association accepts no members except through the local or county associations. It confines its voting to delegates sent by these local associations, one delegate for each ten members in the local, one delegate being allowed to vote all the votes of his association.

This association is in no way connected with the Ohio Plant Breeders' Association, which gives its entire attention to the breeding of plants and the recording of the records of such breeding.

The Ohio Corn Improvement Association proposes to improve Ohio's corn crop both in quality and quantity

by encouraging growers to select the best varieties for their soil and purposes, to select their seed in the fall from the standing stalks, to care for it properly during the winter, to test each ear in the spring, to use the best rotation of crops, to use stable and green manure in the best manner, to apply proper commercial fertilizers, to prepare the seed bed in the best manner, to cultivate the crop in the best manner, to use the best methods in harvesting and disposing of the crop whether it be taken to the elevator or fed to live stock as grain or silage, and always to do these by the most economical methods.

The association proposes to do this by encouraging local associations to have neighborhood or county variety tests, to have special corn sessions at their institutes, to have local corn exhibitions and send corn to the state and national expositions, to interest their boys and girls in studies of all corn questions, to arrange for larger premiums at the county fairs, and to assist local people in selling all high quality seed or in purchasing, if need be, seed of similar quality.

The lines of improvement which will most easily and quickly increase the present production are (1) improvement in the quality of seed planted, (2) improvement in the condition of the soil, (3) improvement in methods of cultivation. The first is a sure and inexpensive way of increasing the production and is the means that usually receives the least attention by corn growers in general. Many farmers who give considerable attention to improving the fertility of their farms and to bettering their methods of cultivation take their seed corn from the supply that happens to remain in the crib



"WHEN FROST COMES THEY GATHER IT INTO SHOCKS".

at planting time, without considering that their production largely depends upon the quality of seed they plant. They place all corn in two classes—white and yellow.

Under the improvement of the quality of the seed corn would come the selection of the best varieties for the particular soil and purposes. Not all varieties are suited to the same soil, climatic conditions or for the same purposes. Therefore, neighborhood or county variety tests are desirable in order that the farmer may learn for

himself which is the best variety for his particular conditions.

The selection of the seed in the fall from the standing stalks is also important in improving the seed. Many progressive farmers are beginning to realize that the rail pen or the middle of the crib are not the places to look for seed of high quality, and for the sake of high quality along other lines than germination they realize the necessity of fall selection of the seed.

Ears of corn are not always as valuable as they appear to be. An ear

which is good because of inheritance is more desirable than one whose superiority is due to especially favorable surroundings. Where the corn is selected from the shock, wagon or crib, a large per cent. of the ears are excellent because they have grown under more favorable surroundings than the average. By selecting the seed in the fall from the standing stalks it is possible to select the ears from hills in which there are two or three healthy and vigorous stalks, and thus the seed will be from more nearly average conditions and the size and maturity of the plants may also be taken into consideration.

If the seed is not gathered and so cared for that it either thoroughly dries out before freezing weather arrives or else is kept where the temperature does not fall much below freezing, the vitality will likely be greatly impaired, and upon the vitality of the seed depends the crop. It is highly important every year that the ears which are to be used for seed be tested as to their ability to germinate. Few people seem to realize the harm that is done by planting inferior seed. When we reflect that often one-fourth to one-half of the seed fails to grow, we can easily see the effect on the profits. Even worse than the seed which fails to grow is the seed which sends forth a puny plant which yields no harvest, but appropriates as much or more plant food than its strong and vigorous neighbor.

The germination test may easily be done in the winter or early spring before the rush of work is on, and the increased yield, to say nothing about the smaller amount of replanting to be done, will pay large dividends on the cost of labor of conducting the test. There are many ways of conducting

the germinating test, some more satisfactory than others. The seeds may be placed between moist blotters, put in a regular germinating box or various other methods used. In all cases care should be taken not to give the germinating seeds conditions which are a great deal more favorable than the field conditions. If the seeds are kept where the temperature falls to 40° or 50° F. at night, the conditions will be more similar to the field conditions, and the seeds which germinate in the tester under these conditions would very likely have germinated in the field.

Another important point in the germination test is to number the ears tested with the same number as that given the seeds of that particular ear in the tester. By this method an accurate record may be kept, and the ears which show the highest vitality may then be known and can be used for seed, while those of low vitality should be discarded.

The problem of fertility maintenance is a great one and lies at the foundation of the corn crop. We can hardly expect to grow corn year after year in continuous culture, selling the crop to be fed elsewhere, and maintain even our present moderate yield per acre. Under improving the corn production by improving the condition of the soil would come the use of the best rotation of crops, the using of stable and green manure in the best manner, the application of the proper commercial fertilizer whenever and wherever necessary and the preparation of the seed bed in the best possible manner. Since the corn is a rapid grower, a large supply of ready available plant food is necessary, and the soil therefore should be put in the best possible condition before planting.

Improving the corn production by improving the methods of cultivation is largely a matter of experimenting, since methods which give the best results in one section often fail altogether in another section. However, with a little experimenting, coupled with good judgment, each individual may soon decide what is best under his

conditions to increase his yield of corn per acre, and since corn is king of the cereal crops in the United States no one can afford to deprive himself of the large returns which will be his if he only does something to help improve his corn, either in quality or in quantity.

JUDGING CONTEST AT STATE FAIR

The judging contest attracted considerable attention in the live stock section of the State Fair. For the first time the board provided cash prizes, of which the highest was \$20 and the lowest \$5, to be awarded to young men showing highest efficiency as judges of stock. Forty-six persons competed, including a number from the College of Agriculture. The stock judged consisted of parts of the rings exhibited for the official awards, and the reports made out by the contestants were graded on the basis of their agreement with the decision of the awarding judge of the breed. The contestants passed upon two rings of Shorthorn cattle, one ring of Percheron horses, one ring of Poland China hogs, one of Duroc Jerseys, one of Oxford ewes and one of Rambouillet rams.

Out of a possible score of 500 points,

Mr. C. C. Long, Cardington, Ohio, was first, with 444 points; Mr. G. A. Dix, Delaware, Ohio, second, 429 points; Mr. D. C. Mote, Greenville, Ohio, third, 425 points; Mr. J. G. Lyle, Cadiz, Ohio, fourth, 412 points; Mr. C. E. Snyder, Monroeville, Ohio, fifth, 402 points; Mr. R. M. Wilber, Marysville, Ohio, sixth, 392 points. Fifty points were allowed for the placing in each ring, and out of 350 points possible for perfect work aside from assigning reasons, Stanley A. Gerber, Hamilton, Ohio, secured 258 points; H. E. Heron, Chandlersville, Ohio, 256 points; Earl Hyslop, Springfield, Ohio, 242 points. Several members of the State Board who witnessed the work done in the contest have expressed themselves as favoring the extension of the work of the contest for the fair of next year.

"THE KORN KORNER"**CORN COMING TO ITS OWN***Joe E. Wing*

Once there were two angels in Heaven, one had been born there, the other was a newcomer, comparatively, at least he had been there only a few hundred years. They strolled down a long, golden street, beneath lovely trees that dropped white and scented petals to lie beneath their feet. It was a mighty pleasant prospect all around, as fine as imagination could conceive. Yet one angel wore a frown of discontent: "I'm sick of all this" he murmured with a sigh. "What, weary of it? You ought to be grateful," his comrade responded with an amused smile. "Grateful for what? This is only Heaven," the weary angel responded.

"Yes, that is true," the older angel replied, as a far-off look came across his face, "but, my dear brother, if you were a newcomer here, as I am, you would realize, as you do not now, what a good thing it is to live here. Why, I have lived on Earth—that's a good country—I have lived on other planets, mighty interesting some of them; I've peeped down into Hell; and I tell you this place for beauty and comfort and real value lays them all out. It's really a pity, though, that you were born here. You ought to be an emigrant, as I am, then you would tune up that harp of yours and the days would not be long enough for you to sing the praises of Heaven where you are." That's what is the matter with us who live in the Corn Belt. We have lived here too long to know the wonderful beauty of the corn plant and the wonderful value

of it, too. We look over the fence and say, "Oh, that's only a field of corn," and look away. Why, friend, a field of corn, if it is a good field, is the most beautiful field on earth. There is grace and beauty, yes, and riches, yes, and whispering magic, yes, and poetry, too, and then there is the harvest, the marvelous harvest of it! Nothing else in the world is like unto it. The palm and orange are triflers compared to corn. It is so much more beautiful, so much richer in its gifts to man. Corn is a homely thing, it surrounds the pioneer's cabin, it gives him roasting ears and succotash, its stalks then feed his cow as he milks her at dewy eve by the stable door; when frosts come and he gathers it into shocks, how good it looks, how safe it makes him feel, how grateful to the good God who made it grow so well; and then, when he goes afield to husk it, each ear a fresh marvel all wrapped in tissue paper, dainty, clean, sweet, nourishing, each stalk bearing food enough for a meal for the family, is it any marvel that the pioneer loves corn and almost worships it?

Now let's get back once again to that spirit, let's see our corn with new eyes, discover again its wealth and its beauty, seek out the best ears for planting, discover new and better types, gather at the corn show to talk of its wonders, and come to the corn dinner to learn of its delicious qualities. Let us learn to grow it, to harvest it, to keep it, to grind it, to make mush and corn bread and Johnny cakes, then won't we once more have serene joy and peace and content, yes, and gratitude, too, to the Giver of corn, best of all grains, to mankind?

A CORN DINNER.

A new feature which has been added to the program of the State Corn Show to be held at Columbus during the week beginning November 23 is a big corn dinner for Thanksgiving evening. Corn fed turkey and various dishes prepared wholly or in part from corn will be served in a variety of ways that will illustrate the possibilities and future of corn and in a style that will satisfy the Thanksgiving appetite of the corn grower and lend to the enjoyment of the occasion. Some of the most humorous and entertaining speakers identified with agricultural interests will be present to respond to toasts. Other enjoyable features are being planned by the committee in charge. The day, the dinner, the decorations, the addresses, the guests, will harmonize in the one idea of a big-hearted social and fraternal gathering of the agricultural interests, and every detail of the plans will be so arranged as to lend to the poetry of the occasion. It will be an occasion entirely unique in the history of agriculture, and every farmer and stockman, every grain dealer and everyone interested in agriculture should plan on being present.

STUDENTS JUDGING CONTEST AT NATIONAL CORN SHOW.

There will be three divisions of the students' judging contest at Omaha—(a) corn judging, (b) oat judging and (c) wheat judging.

In each of the three divisions the several grain exchanges will be asked to put in samples and furnish a representative to conduct the commercial grading of each of these grains as a part of the contest.

Chicago standards will be used on

oats and corn, Kansas City on hard winter wheat, St. Louis on red winter wheat and Minneapolis on spring wheat. Each of these markets will be asked to send a competent inspector, who will provide fifty samples of each of the three grains, properly numbered, and give the students opportunity to attach to each of the samples grades and give their reasons. The inspector will first discuss the commercial grading of grain. After the students, by divisions, have worked over the samples and made up their markings, with reasons, the inspector will attach his grades and give his reasons in full.

There seems to be a rather wide range of standards upon these several markets, and the grain dealers who are interested with us in this great enterprise feel that this exposition can be a means of standardizing the grades upon the several markets and thus render them a service, as well as giving the students judging an opportunity to gather information from these great markets, which distribute millions of surplus bushels.

The following is an extract from a letter written by the general manager of the National Corn Show:

"Concerning the students' judging contest, I believe that I am in a position to weigh the matter out thoroughly and form rather an accurate conclusion as to the value of a students' judging contest and the incentive and also the disappointments that may follow.

"The writer entertains the idea that instead of inviting the students to come here merely upon a prize winning mission that we should so manage the plans that they will prove an incentive for the larger body of students in their classified work at the colleges that will prompt them to take a keener interest in farm crop economics

than they would take if there be no students' judging contest for them to anticipate.

"The writer is aware that some of the students' judging contests in the past, especially those along animal husbandry lines, have been so managed that rather severe criticism followed. I believe that we can profit by experience in the past and eliminate this unfortunate element. After talking with some of the leading members of the Chicago Board of Trade and other grain exchanges, we find that they are ready to respond and lend aid for a movement that will bring the students in the several agricultural colleges closer to their work. When in Chicago recently I talked with the head buyer for the Quaker Oats Company, and he has agreed to attend and deliver a lecture, discussing their interests with the grain grower. We desire to have the milling interests represented and have them to aid as referees and judges in some of our classes. Perhaps when I explain that I found in South Dakota a range of price amounting to 12 cents per bushel on wheat you can better understand why we feel it important that we should get our several interests closer together. The grain grower in the Northwest insists

that he can no longer produce the blue stem wheat profitably. Their best yielding varieties are being discriminated against upon the Minneapolis markets, and the grower naturally feels disappointed. Perhaps there is a reason for it, but we want to know the reason, and we want to do it in a business-like, decent way. The writer is arranging to bring exhibits of these different types of wheat from different states, so that they may be judged and milled, and allow the grower to know whether or not there is a just basis for the wide range in market values. Such information, secured by such an organization as our National Corn Association through the co-operation of the several commercial interests, ought to be of economic interest.

"The several colleges do not have an opportunity to investigate these branches of the work as thoroughly as they should, and we desire to aid them so that it may be presented to their body of students in an intelligent and dependable way."

If the various colleges take enough interest to send five-men judging teams it seems insured that their traveling expenses will be paid. The corn men in charge of the show are pushing, and prospects are bright for a great show.

COYOTE PROOF FENCE

Fencing the range to protect sheep from the attacks of predatory animals has met with excellent results in the Wallowa National Forest, Oregon. The problem was to find a strong fence that would make sheep secure, even without the care of a herder.

The chosen fence, which is built of woven wire with barbed wire on the top, has kept out all the minor animals,

such as wildcats, lynxes and coyotes, but has not withstood the attacks of the grizzlies, which are apparently able to pass through it with little trouble.

Sheep numbering 2200 head were placed in the enclosure with their lambs upon June 20 and have been allowed to graze at their free will, with no attention whatever from any herder.

(Concluded on page 26.)

AT THE DAIRY SHOW

THE DAIRYMEN'S PROGRAM.

Under the direct supervision of Chief Ed. H. Webster, of the Dairy Division, there will be held a dairymen's convention at the third annual National Dairy Show, which takes place in Chicago at the Coliseum, December 2 to 10 inclusive. It is the purpose of this convention to deal with subjects of national importance, and the program will be filled with men who will be eminently capable of dealing with subjects of the highest interests to dairy farmers.

No dairyman who can possibly leave his work can afford to miss this convention or miss seeing the large exhibit of dairy machinery and cattle which will be on exhibition at that time. The show comes at a season when the farmers have completed their year's work, and they should make it a point to take a few days for recreation and enjoyment. Not only will they find a trip to the dairy show a pleasant one, but it will be the means of giving them an understanding of the scope and magnitude of the dairy industry as well as a source of much useful information.

THE STUDENTS' JUDGING CONTEST.

At the third annual National Dairy Show, which is held in Chicago December 2 to 10 inclusive, will be held a students' judging contest. Any student of an agricultural college or of a secondary school which is under the direct supervision of a state agricultural college, who is regularly matriculated in at least a two years' course in agriculture or dairying and who has taken not less than twelve weeks' work during the calendar year in which the show is held may enter.

There are six teams who have already expressed a desire to enter this dairy judging contest. Any institution interested in this contest may obtain a copy of the rules and regulations governing it by writing directly to B. H. Rawl, Dairy Division, Washington, D. C.

A CONTEST

For Managers and Secretaries of Creameries and Cheese Factories.

One of the features of the third annual dairy show is a contest and program for the managers and secretaries of local creameries and cheese factories.

At the suggestion of the Dairy Division, Washington, D. C., the National Dairy Show Association has placed at its disposal the sum of \$2000 to be divided pro rata among local creamery and cheese factory managers and secretaries. The contest and program is under the supervision of Mr. B. D. White, Dairy Division, Washington, D. C.

It was first thought advisable to have a butter exhibit and a buttermakers' program of about two days, such as was conducted at the last National Dairy Show. But the buttermakers had a convention in St. Paul only last March, and it was asking too much of them to again attend a convention of national character this fall. However, the buttermakers will not be neglected, as they will have the full benefit of the managers' and secretaries' meeting, and if it is desired one-half day will be devoted to a buttermakers' program.

FERTILIZER FOR FRUIT GROWING*F. K. Fisher, '08*

The fact that orchards use up the plant food of the soil and that these should be replaced in some form seldom seems to enter the mind of the average fruit grower. The fact that the orchard leaves the land in poorer condition than an average grain crop does not seem possible to the fruit growers and the farmers of the country, but nevertheless this is the case, because in the grain crops a certain amount of the plant food is returned to the soil in the by-products, as straw and manure, but in the orchard this is not true. Besides the fertilizing constituents of the soil removed by the product of the trees in the form of fruit, there is also a large quantity of valuable plant food locked up in the trunk and branches of the tree for many years.

The use of commercial fertilizers and manures in the orchard has come into use within the last decade and has proven a very valuable factor in the production of orchard fruits for the market. The exact amount of fertilizers to add to the soil cannot be definitely determined, but a good rule to follow is to add as much fertilizer to the soil as will give a profitable return on the amount of money or capital expended.

If the soil is very rich when the young orchard is planted, abundant crops may be produced for several years without the addition of a fertilizer in any form, but where the fruit is removed and sold year after year and nothing is returned to the soil to replace the elements removed by the fruit sooner or later there will be a decrease in the growth of the trees and a deterioration in the quality of the fruit produced.

The need of the addition of commercial fertilizers to the soil to produce a good crop has been felt more keenly in the eastern part of the United States than in the western part, due to the impoverished condition of the soil in those regions. This is most strikingly illustrated by the New England States.

In the addition of the fertilizers to the soil one must take into consideration that the feeding surface of the roots are the root hairs, and so the feeding portion of the roots may be several feet away from the base of the tree. In order to meet this condition one must add an excess of the fertilizer and spread it over a fairly large area to insure that the plant will be able to make use of the fertilizer which has been added.

It is a well proven fact that the soils have the power of changing the solubility and availability of the plant food which may be put upon them in the form of fertilizers. It has been proven that on the addition of phosphoric acid to the soil in the water soluble form that it soon becomes quite insoluble in water, and for a considerable time it diminishes in availability. This fact will hold good in the case of potash also. As to nitrogen, there has been a great deal of work done, but as yet little is known as to its incomings and outgoings in the soil. It is known that barren lands will decrease in their amounts of nitrogen and that meadow and pasture lands will increase in their amounts of nitrogen year after year. This fact is due to the presence of certain bacteria in the roots of the leguminous plants, which gives the plant the power to absorb and use the free nitrogen of the air.

The losses of fertilizers from the soil are due to (1) leaching out in the drainage waters, (2) escaping into the air as a gas, (3) conversion into inert forms.

For these reasons soluble and active fertilizers should be applied to the soil in small doses and relatively near the surface of the ground and at short intervals, while the cheap and more insoluble fertilizers may be applied in larger quantities and mixed deeper in the soil.

The amount of any fertilizer to add to a soil must be found out by experience or experimenting, as the different soils vary greatly in their composition.

It has been found that potash was the most important element in the production of the fruit and that 50 per cent. or more of the ash of the fruit was potash. Phosphoric acid is essential in the ripening of the fruits and lime aids in the coloring of the fruits.

After determining that the soil needs fertilizers one has two sources of fertilizers to select from—manures and commercial fertilizers. The stable

manures aid the physical condition of the soil very markedly, and this is often their greatest value, although they also add great amounts of the necessary fertilizing elements. As a general rule, in the addition of manures to the soil it is always best to apply them to the hard and dry spots, as they improve the physical condition of the soil.

The lack of nitrogen in the orchard is made manifest in the growth of the tree and the color of the leaves. If the orchard is in need of nitrogen, it is best supplied in the form of the nitrate of soda.

Potash is the most important element in fruit growing. If potash is needed, wood ashes are good, but the majority of the fruit growers favor the muriate of potash.

For the addition of the phosphoric acid there are several compounds which have met with great favor, but it has been found that dissolved bone generally gives the best immediate results, but that the basic slag was superior where the immediate results were not taken into consideration.

“BILL” MARTIN ON THE FARM

In the October 8th issue of the *National Stockman and Farmer* there appears on the first page large pictures of the buildings on the farm of N. S. Martin and son and on another page of the same issue a lengthy article by Homer W. Jackson, giving the successful method of working this farm. “Bill,” the son,

graduated from O. S. U. in 1906. His success is one of many which go to show that college men going back on the farm demonstrate strongly enough to any doubting persons that a college education pays the young man in a purely business way, leaving out entirely the inestimable moral value obtained.

THE
AGRICULTURAL STUDENT

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HARRY E. SNYDER.....Business Manager

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OCTOBER

EDITORIALS

The college has been blessed this year with the entrance of a great number of Freshmen and, by all appearances, Freshmen of very high quality. The kind of Freshmen who make pushing college men, who come with a well-defined purpose and who let nothing whatever sidetrack or lower that purpose.

They show very plainly that the Agricultural College is being recognized throughout the state for its true value and insure without any doubt a bright future for the college and for agriculture. People are recognizing the fact that while farming means a sacrifice in the extent of one's close association with a large number of one's fellow men and with the hustle and bustle of rapidly advancing business and science, still the occupation recompenses for the sacrifice in the "back to nature," independent and highly moral life which it gives.

To the Freshmen THE AGRICULTURAL STUDENT wishes to extend a hearty welcome and would offer a few suggestions which experience has instilled into upper classmen.

First of all, go to college affairs of all kinds. Make yourself a part of them always. Provide part of the en-

tertainment if you are capable. Go to the college social functions. Join a literary society. Enter athletics. By doing these things you will widen your circle of acquaintances, of friends, and, while it may seem to take some money and while it may take some moral courage to enter athletics about which you know nothing, still in the end you will find yourself repaid with manyfold over in a mind that is broad and full, quick to understand others and to respond to their needs. The man who is a "dig" and a "book worm" is not always the man sought after as worthy of a high salary. Merits do not necessarily spell capability. Mind, we do not wish to discount the value of high scholarship, but with it should go the power to please and influence men which is acquired only by close association with many men in various lights. If you do not acquire this power in any degree in your college life, you will have been, to say the least, not very successful.

Now that we have so many such promising Freshmen, let's set them a good example in loyalty to the college, to college societies and to the official voice of the college, THE AGRICULTURAL STUDENT. At present we haven't any record in that line about which to be proud. There should be more interest in the various college societies and in this paper. The meetings should be better attended and the paper more universally subscribed for. Even were it possible that the meetings will not do you any good and probably you will not read this paper, but nevertheless the fact that you belonged to a college where there was spirit, where things were on the move, which supported one of the best college papers, should be worth a great deal to you, for it will be a monument to your col-

lege activity, as those things will not be possible unless everyone is pushing, and that means you.

NEWS NOTES

GRADUATE SCHOOL OF AGRICULTURE.

The third session of the Graduate School of Agriculture held during the past summer at Cornell University was well attended by Ohio State University men. The College of Agriculture was represented by Dean Price, Professors McCall and Shoesmith and Mr. Hyslop, of the Department of Agronomy; Mr. Guthrie and Mr. Wystrom, of the Dairy Department, and Mr. Williams, of the Animal Husbandry Department. There was also in attendance a number of graduates who are now located in other states.

One of the most interesting features of the school was the series of lectures given by A. D. Hall, director of the famous Rothamsted Station in England.

The sessions of the Graduate School are held biennially, the place being chosen by a committee of the Association of Agricultural Colleges and Experiment Stations.

It is probable that the next Graduate School will be held at the Iowa Agricultural College during the summer of 1910.

Mr. Guthrie, who was an instructor in the Dairy Department last year, has gone to Cornell to take up special work in milk flouring and milk condensation with Mr. Cavaughan, who is the chemist at Cornell University and is also president of the milk flouring factories of New York. Mr. Nystrom, Mr. Clevinger and Mr. Steiner will have charge of the work Mr. Guthrie left.

Wm. Henry is field manager of Heleviate Condensing Company and will have charge of a new factory at Pontiac, Mich.

E. D. Hensen has purchased a creamery at Somerset.

J. C. Degenfelder, an assistant to Mr. Clevinger in the O. S. U. laboratory, has accepted a position in a creamery at Richfield.

J. A. Duncan has organized a creamery company and built a creamery in Illinois.

F. E. Meeks is in a creamery near Pittsburg.

The next annual meeting of the American Association of Farmers' Institute Workers will be held at Washington, D. C., November 16 and 17. At the same place and beginning November 17 will be held the annual meeting of the Association of American Agricultural Colleges and Experiment Stations. The secretary of the Association of Colleges and Stations writes that it seems impossible to secure reduced railroad rates.

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THE CLASS OF '98.

Camille Staver is at Akron, Ohio.

Louis Risser is farming at Pandora, O.

Robert Cory is farming at Frankfort, Ohio.

John W. Winchet is farming near Dayton, Ohio.

Ray Borrer is in the creamery business in Colorado.

H. S. Hartman has charge of the swine at O. S. U.

Agnes Smiley is teaching domestic science at Piqua, O.

Grace Cockins is teaching domestic science in Columbus.

Joseph Barker is assistant in soil physics, Ames, Iowa.

B. L. Thompson is on the Holden farm, near Cleveland.

Clara O. Smith is an assistant in domestic art at O. S. U.

Anna Leaming is teaching domestic science at Sidney, Ohio.

Albert Moist is located at Barrington, Ill., on the Hawthorne I farm.

Mary Fleming is teaching in the graded schools of Franklin county.

Louise Whipps is teaching domestic science in the W. E. I. U., Columbus.

Ada A. Noyes is teaching domestic science and domestic art at Greenville, Ohio.

Ruth Pierce is teaching domestic science in the Cincinnati public schools.

J. Oscar Williams is an assistant in the Bureau of Animal Industry, Washington, D. C.

James Edmonds is instructor in ani-

mal husbandry at the Minnesota Agricultural College.

Orville Johnson is an agricultural lecturer for the German Kali Works, New York City.

Clarence Woodard has charge of the cattle on Booker T. Washington's Institute, Tuskegee, Ala.

Roland Rodgers is a traveling salesman for a book agency, with headquarters at Kansas City.

Ed. Kinney is assistant entomologist and botanist at the Kentucky Experiment Station, Lexington, Ky.

Firman Bear, R. C. Collison and L. E. Collison are assistants in the Department of Agricultural Chemistry, O. S. U.

Henry Vaughan is working out his master's degree in animal husbandry at O. S. U. He is also editor-in-chief of The Lantern.

E. J. Kitchen, '07, former editor of THE AGRICULTURAL STUDENT, was married on September 22 to Miss Martha Miller, of Greenville, Ohio.

COYOTE PROOF FENCE.

(Concluded from page 20.)

They have done splendidly, and as far as the observation of those in charge of the experiment goes a given area grazed by sheep under such conditions will carry more sheep per acre than one grazed under the charge of a herder.

Tracks along the fence show that predatory animals come to the fence constantly and follow it around, but, with the exception of the bears, do not seem able to enter.

The hunter employed by the service for hunting predatory animals in the vicinity of this fenced enclosure has



THE LAST LOAD.

killed no less than six large grizzlies this season, besides numerous other animals of the predatory class.

The results of this experiment are so satisfactory thus far that private individuals are profiting by it. Mr. J. W. Emmons, of Troy, Ore., has a large area of private land fenced with a special wire fence, in which he has this season lambled a herd of 670 ewes without a herder's care and with very little attention and great success. Mr. Emmons is extending his fence, for he finds that it pays.

Careful record will be kept of the weights of lambs raised inside this fence, with a view of comparing them with the same grade of lambs raised outside the fence on the same class of range, so that any gains or losses in weight and growth may be determined.

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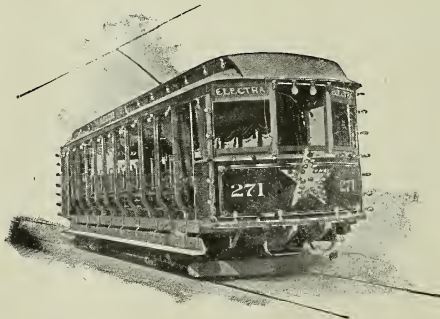
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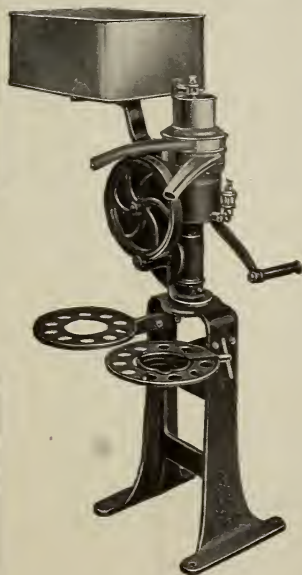
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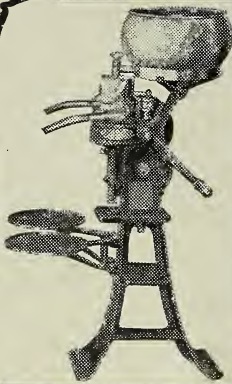
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